NAVAL POSTGRADUATE SCHOOL
Monterey, California

EC 3550 MIDTERM EXAM I 10/96 Prof. Powers

- This exam is open book and notes.
- There are three problems; each is equally weighted.
- Partial credit will be given; be sure to do some work on each problem.
- Be *sure* to include units in your answers.
- Please circle or underline your answers.
- Do *NOT* do any work on this sheet.
- Show *ALL* work.

1	
2	
3	
Total	

Name: _____

1. A fiber that is 30 km long has an attenuation of 0.30 dB/km at 1550 nm. The Raman scattering threshold power at this wavelength is 3.0 W. Find the MFD of the fiber.

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2. Consider the two fibers with the properties listed below.

Parameter	Fiber #1	Fiber #2
Core diameter (μm)	62.5	50
Core index	1.45	1.45
g	∞	2.0
Δ	1.5%	1.0%

   Find the total loss (*in dB*) due to any mismatched fiber parameters when a splice is made and the light travels from fiber #1 into fiber #2. (You may neglect any reflection losses and assume perfect alignment.)

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3. Consider an 8/125 single-mode fiber with $n_1 = 1.452$ and $n_2 = 1.450$. The source is a laser operating at 850 nm, with a spectral wavelength linewidth of 0.1 nm. Assuming that the link length is limited by dispersion, find the maximum link length if the desired bit-rate is 1 Gb/s.
